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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,449	01/19/2007	Akira Takaguchi	1082/HIROSE	2452
7590	06/03/2009		EXAMINER	
Michael Tobias 1717 K Street Suite 613 NW, Washington, DC 20036			ABDEL RAHMAN, AHMED	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/573,449	TAKAGUCHI ET AL.	
	Examiner	Art Unit	
	AHMED ABDEL RAHMAN	4184	

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 24 March 2006.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 9-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 9-17 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 19 January 2007 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. _____.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 10/6/2008, 10/19/2006, 03/34/2006.

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application

6) Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see the background of the invention on page 1 of the specification and the brief description of figure 1 on page 1 of the specification). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 9-11, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Atsushi, Kabe (JP 62-259665), see IDS.

Atsushi teaches:

In regards to claim 9: A wave soldering tank (solder tank 2, figure 7) comprising a soldering tank body (solder storage tank 10, figure 1) for housing molten solder (molten solder 8, figure 1), a solder feed chamber disposed within the soldering tank body and having an inlet disposed below the level of molten solder (inlet 15, figure 1) and an outlet disposed above the level of molten solder in the soldering tank body (jet nozzle outlet 18, figure 18, abstract) and a multiple-blade screw-type pump disposed in the inlet so as to draw molten solder into the solder feed chamber through the inlet and discharge molten solder through the outlet (screw 23, figure 7).

In regards to claim 10: A wave soldering tank as claimed in claim 9, wherein the pump includes an impeller (screw pump 23, figure 7) comprising a rotatable hub (rotary shaft 24, figure 7) and a plurality of helical blades secured to the hub at equal intervals in the circumferential direction of the hub (blades 25, figure 2).

In regards to claim 11: A wave soldering tank as claimed in claim 10, wherein each of the blades overlaps an adjoining one of the blades when the blades are viewed in the axial direction of the impeller (screw pump 23, figure 7 and blades 25, figure 2).

In regards to claim 14: A wave soldering tank as claimed in claim 9 wherein the solder feed chamber comprises a partition which divides the interior of the soldering tank body into an upper

and lower portion (intermediate bottom plate 6, figure 8), the inlet comprises an opening formed in the partition (opening 6d, figure 8), and the pump includes an impeller and a cylindrical casing disposed in the inlet and surrounding the impeller (cylinder 26, figure 2), the impeller being rotatably disposed in the casing so as to transport molten solder in an axial direction of the casing (rotary shaft 24, figure 7).

In regards to claim 15: A wave soldering tank as claimed in claim 14 wherein the solder feed chamber includes a duct (duct 19, figure 1, figure 8, figure 9) which extends upwards from the partition (opening 6e, figure 8) and a nozzle disposed at an upper end of the duct and extending above the surface of molten solder in the soldering tank body (jet nozzle 18, figure 1).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 12 -13 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atsushi, Kabe (JP 62-259665) as applied to claims 9-11 and 14-15 above, and further in view of Gerstenberg (US 7,165,933).

The teachings of Atsushi have been discussed above

Atsushi fails to disclose (re claim 12) wherein a wave soldering tank as claimed in claim 11 wherein the impeller comprises four helical blades provided at equal intervals in the circumferential direction of the hub, each blade extending around the hub by at least 120.degree. between first and second ends of the blade; (re claim 13) wherein a wave soldering tank as claimed in claim 10 wherein each of the blades is sloped by at most 45.degree. with respect to a plane perpendicular to a rotational axis of the hub; (re claim 16) wherein a wave soldering tank as claimed in claim 14 wherein a lower end of the impeller extends 5-10 mm below a end of the casing; (re claim 17) wherein a wave soldering tank as claimed in claim 14 in a clearance between the casing and the impeller is 0.1-1 mm.

However, Gerstenberg discloses a method for transporting emulsions using a screw type pump (abstract) where preferably 2-5 screw blades are used and placed equidistantly around the rotor, i.e. shaft, (column 3, lines 65-68, column 4, lines 1-5).

In view of Gerstenberg's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to specify an impeller with four helical blades, with at least 120 degrees between the first and second end of blades (re claim 12). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the slope ranges of the blades, distance ranges between the bottom of the impeller and the end of the casing, and the distance between the casing and the impeller through process optimization (re claims 13, 16, and 17) since these components are optimized in order to achieve the maximal force applied to the solder or product in the axial direction rather than the radial direction , also since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involved only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

6. Claims 9-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al (JP 02205257A).

Abe et al teaches:

In regards to claim 9: A wave soldering tank comprising a soldering tank body (solder tank 11, figure 3) for housing molten solder (molten solder 13, figure 3), a solder feed chamber disposed within the soldering tank body (chamber 41, figure 3) and having an inlet disposed below the level of molten solder (inlet 43, figure 3) and an outlet disposed above the level of molten solder in the soldering tank body (nozzle outlet 18, figure 1), and a multiple-blade screw-type pump disposed in the inlet so as to draw molten solder into the solder feed chamber through the inlet and discharge molten solder through the outlet (centrifugal effect pump 14, figure 3).

In regards to claim 14: a wave soldering tank as claimed in claim 9 wherein the solder feed chamber comprises a partition which divides the interior of the soldering tank body into an upper and lower portion (partition 15, figure 1), the inlet comprises an opening formed in the partition (opening 16, figure 1), and the pump includes an impeller and a cylindrical casing disposed in the inlet and surrounding the impeller (cylindrical casing 22, figure 1), the impeller being

rotatably disposed in the casing so as to transport molten solder in an axial direction of the casing (impeller 14, figure 1)

In regards to claim 15: a wave soldering tank as claimed in claim 14 wherein the solder feed chamber includes a duct (area under opening of nozzle 18, figure 1) which extends upwards from the partition and a nozzle disposed at an upper end of the duct and extending above the surface of molten solder in the soldering tank body (nozzle 18, figure 1).

The teachings of Abe et al. have been discussed above.

However, Abe et al. fail to disclose specifically the use of a multi bladed screw type pump within their invention. It is the view of the examiner that Abe et al's, invention inherently disclosed the use of a screw type pump when mentioning the desired "centrifugal effect of the pump" (abstract and constitution). However, even if the screw type pump is not already inherent in Abe; modifying Abe to include it would have been obvious for substitutive obvious predictable results. In regards to claims 10, 11, 12, 13, 16, and 17, it would have been obvious to one of ordinary skill in the art at the time of the invention to structurally optimize the amount of blades , the slope of the blades, the positioning of the blades, the distance between the impeller and the casing, and the clearance between the casing and the impeller since these process parameters are structurally optimized in order to achieve the maximal force applied to the solder or product in the axial direction rather than the radial direction , also since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or

workable ranges involved only routine skill in the art. *See In re Boesch*, 205 USPQ 215 (CCPA 1980).

7. Claims 9-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa (US 2004/0211816) in view of Atsushi, Kabe (JP 62-259665) .

Ogawa teaches a wave soldering tank (wave soldering apparatus 10, figure 1) comprising a soldering tank body (solder reservoir 12, figure 1) for housing molten solder, a solder feed chamber disposed within the soldering tank body and having an inlet disposed below the level of molten solder (inlet 42, figure 1) and an outlet disposed above the level of molten solder in the soldering tank body (outlet 36, figure 1),

Ogawa fails to disclose in regards to claims 10, 11, 12, 13, 14, 16, and 17 using a screw type pump when using the soldering wave apparatus, the amount of blades , the slope of the blades, the use of a partition, the positioning of the blades, the distance between the impeller and the casing, and the clearance between the casing and the impeller.

Atsushi discloses the use of using a screw pump with a partition (purpose and constitution). In view of Atsushi, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ogawa's structural apparatus use of a broad multi blade impeller pump (pump 44, figure 1, and paragraph [0013]) to a narrower embodiment of a multi blade screw type pump because it is still an impeller type pump that rotates around a shaft or hub used to pump a uniform output solder stream from the said inlet to the said outlet (claim 30). It would have also been obvious to one of ordinary skill in the art at the time of the

invention was made to use a multi blade screw type pump where the blades were secured to the hub or shaft at equal intervals in the circumferential direction of the hub, as are the Impeller blades used in figure 2 of Ogawa's disclosure to achieve obvious predictable results due to the substitution. In regards to claims 10, 11, 12, 13, 16, and 17, it would have been obvious to one of ordinary skill in the art at the time of the invention to structurally optimize the amount of blades , the slope of the blades, the positioning of the blades, the distance between the impeller and the casing, and the clearance between the casing and the impeller since these process parameters are structurally optimized in order to achieve the maximal force applied to the solder or product in the axial direction rather than the radial direction , also since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involved only routine skill in the art. *See In re Boesch*, 205 USPQ 215 (CCPA 1980).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ishii et al. (US 4,773,583) and Takeda et al. (US 5,769,305), both disclose apparatuses used for wave soldering. Shigematsu et al(US 5,301,862), Nakagawa (JP 56023371), and Masuda (JP 58013470) are all USC 102 (b) references, while Allen et al (US 4,447,001) is a 103 (a) reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AHMED ABDEL RAHMAN whose telephone number is (571)

Art Unit: 4184

270-5931. The examiner can normally be reached on Mon-Thurs, 7 30am- 5 00pm, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jared Fureman can be reached on 571-272-2391. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**/AHMED ABDEL RAHMAN/
Examiner, Art Unit 4184**

**/ISAM ALSOMIRI/
Primary Examiner, Art Unit 3662**